

CLAIMS

1. A fuel cell system comprising: at least two fuel cell stacks configured to receive supplied reaction gases comprised of an oxidant gas and a fuel gas to generate electricity by electrochemical reaction; a humidifier configured to humidify at least one of the reaction gases to be supplied to the fuel cell stacks; and a reaction gas supply pipe configured to feed the reaction gas from a reaction gas exhaust port of the humidifier to reaction gas supply ports of two of the fuel cell stacks,
- wherein the humidifier is disposed between the two fuel cell stacks; and
- wherein the reaction gas supply pipe is bifurcated at a bifurcation point into two portions directed toward the two fuel cell stacks respectively, the lengths of the portions from the bifurcation point to the reaction gas supply ports of the two fuel cell stacks being substantially the same.
2. A fuel cell system according to claim 1, wherein the humidifier is configured as a membrane type humidifier to transfer moisture contained in an exhaust gas discharged from the fuel cell stacks, through a water-permeable membrane to the reaction gas.
3. A fuel cell system according to claim 2, wherein the water-permeable membrane is in a shape comprised of hollow fibers aligned in one direction,
- each fuel cell stack being comprised of single cells stacked in a longitudinal direction of the tubular hollow fiber water-permeable membrane,
- the reaction gas supply port being formed at one end face of the fuel cell stack facing in a direction in which the single cells are stacked, and

the reaction gas exhaust port being oriented toward a same direction as the two reaction gas supply ports face.

4. A fuel cell system according to claim 3, wherein the two fuel cell stacks
5 are arranged side-by-side relative to the horizontal, and

wherein the humidifier comprises at least two sets of substantially cylindrical humidifiers arranged vertically adjacent to each other, and an exhaust gas discharge pipe configured to carry the exhaust gas discharged from the humidifier is disposed in a position surrounded by two sets of the humidifiers and one of the fuel
10 cell stacks.

5. A fuel cell automotive vehicle equipped with a fuel cell system, the fuel cell system comprising: two fuel cell stacks; a hydrogen supplying device configured to supply hydrogen to the fuel cell stacks; an air supplying device configured to supply
15 air to the fuel cell stacks; and a humidifier configured to humidify air to be supplied to the fuel cell stacks,

wherein the fuel cell stacks and the humidifier are disposed under a floor of the vehicle, transversely with respect to the vehicle, with the two fuel cell stacks located symmetrically rightward and leftward respectively about the humidifier,
20 the air supplying device being disposed frontwardly of the fuel cell stacks and the humidifier,

the hydrogen supplying device being disposed rearwardly of the fuel cell stacks and the humidifier,

the humidifier comprising a supply air introduction port facing toward
25 frontward of the vehicle and a supply air exhaust port facing toward rearward of the vehicle, and

the fuel cell stacks each comprising an air supply port and a hydrogen supply port both facing toward rearward of the vehicle.

6. A fuel cell automotive vehicle according to claim 5, further comprising
5 a cooling water supply pipe configured to carry a cooling water to be supplied to the fuel cell stacks,

an air supply pipe configured to carry air to be supplied to the fuel cell stacks and a hydrogen supply pipe configured to carry hydrogen to be supplied to the fuel cell stacks, as well as the cooling water supply pipe, being combined together to
10 form a monolithic manifold.

7. A fuel cell system comprising: at least two fuel cell stacks configured to receive supplied reaction gases comprised of an oxidant gas and a fuel gas to generate electricity by electrochemical reaction; and a humidifier configured to humidify at
15 least one of the reaction gases to be supplied to the fuel cell stacks,

wherein the humidifier is disposed between the two fuel cell stacks.

8. A fuel cell system according to claim 7, wherein the fuel cell stacks each comprise end plates provided at both ends of stacked single cells, and the
20 humidifier and the end plates of the fuel cell stacks are coupled to each other.

9. A fuel cell system according to claim 8, wherein the two fuel cell stacks and the humidifier are placed within a fuel cell box, and the end plates of the two fuel cell stacks are fixed to the fuel cell box.

10. A fuel cell system according to claim 7, wherein the two fuel cell stacks are arranged side-by-side relative to the horizontal; and

wherein the humidifier comprises at least two sets of substantially cylindrical humidifiers arranged vertically adjacent to each other.

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11. A fuel cell system according to claim 10, comprising reaction gas pipes configured to carry the reaction gases disposed in a position surrounded by two sets of the humidifiers and one of the fuel cell stacks.

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12. A fuel cell system according to claim 7, wherein the humidifier is configured as a membrane type humidifier to humidify the reaction gases through a hollow fiber water-permeable membrane; and

wherein the hollow fiber water-permeable membrane includes bundled hollow fibers each having a tubular shape of which a longitudinal direction is parallel with a direction in which single cells of the fuel cell stacks are stacked.

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